ELYSE PENNINGTON

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EDUCATION

California Institute of Technology (Caltech) August 2022
Ph.D., Chemical Engineering
Minor, Environmental Science and Engineering

Harvey Mudd College May 2017
B.S., Applied Chemistry
Graduated with Distinction and Departmental Honors

STATE GOVERNMENT EXPERIENCE

Fellow, California Council on Science & Technology 11/2022-11/2023

- Developed knowledge of the legislative process, the legislative calendar, the bill-to-law process, writing bill analyses, the executive regulatory process, networking, and more
- Member of the Governor's Office of Planning and Research on the California Initiative to Advance Precision Medicine team
- Co-leading the development of a Request for Information, listening session series, and Request for Proposals for a depression research grant program

RESEARCH EXPERIENCE

Jet Propulsion Laboratory, Tropospheric Composition Group, Postdoctoral Fellow 11/2023-Present

- Quantifying global and regional ozone trends using data from the TROPESS project, including data products from the AIRS, OMI, and CrIS satellite instruments
- Investigating causes of differences between satellite ozone products, including instrument calibration, retrieval algorithms, and environmental influences

Department of Chemical Engineering, California Institute of Technology 9/2017-9/2022

- Quantified the importance of individual pollutant sources to air quality degradation in the Los Angeles Basin using three-dimensional atmospheric chemistry models in the laboratory of Dr. John H. Seinfeld
- Built a data framework to represent the meteorology, emissions, and chemistry of the current Los Angeles atmosphere by running and further developing existing EPA models including CMAQ, WRF, SMOKE, ESTA, and Spatial-Allocator, and performed data analysis in Python
- 3 first-author manuscripts written, 7 co-author manuscripts written, 6 conference presentations given
- Contributed to multiple successful grant proposals

Jet Propulsion Laboratory, Visiting Student Researcher Program 11/2019-9/2022 | Summers 2014, 2015

- Collaboration with my Caltech thesis work: Generated meteorological simulation data of Los Angeles and analyzed the impact of meteorology on air quality in Los Angeles
- Summer intern in the Imaging Spectroscopy group: Improved atmospheric water vapor retrieval algorithm used in NASA airborne spectroscopy missions, researched Titan beach environments using cryogenic conditions and Raman spectroscopy, and contributed to EMIT proposal

Environmental Protection Agency, Student Research Participant Summer 2020

- Member of the Atmospheric Chemistry and Aerosol Branch of the EPA Office of Research and Development
- Contributed to the development of an emissions inventory for consumer products
- Analyzed the impact of individual consumer product species on secondary organic aerosol (SOA) formation
- Developed a chemical mechanism to represent the formation of secondary organic aerosol from consumer products in the Community Multiscale Air Quality (CMAQ) model

Chemistry Department, Harvey Mudd College 9/2014-9/2017

- Studied the formation and evolution of brown carbon in the laboratory of Professor Lelia Hawkins

- Utilized the CESAM cloud chamber at the University of Paris to quantify sources of atmospheric brown carbon
- Operated and analyzed data from UV/Visible spectrometer, Total Organic Carbon Analyzer, and Aerosol Chemical Speciation Monitor and led data analysis using R

Toyota Motor Corporation, Harvey Mudd Engineering Clinic 9/2016-5/2017

- Built an energy systems model to compare energy efficiency in a fuel cell electric semi-truck and an internal combustion engine semi-truck
- Proposed an optimal fuel cell electric semi-truck configuration
- Team leader of the 5-person team in the spring term

COMPUTER SKILLS

Python • MATLAB • R • Mathematica • Igor • Linux • Github • CMAQ • SMOKE • ESTA • WRF • Spatial-Allocator • Microsoft Office

HONORS AND AWARDS

Samsung 2019-2022 Global Research Outreach (GRO) Award • Rose Hills Graduate Fellowship 2017-2018 • American Chemical Society Undergraduate Award in Analytical Chemistry Fall 2016 • Dotty & Art Campbell Award Fall 2016 • William G. Sly Award Fall 2015 • Harvey Mudd College Scholarship 2013-2016 • California Scholarship Foundation 2009-2013 • AP Scholar with Honor 2012 • National Merit Scholar 2012

PUBLICATIONS

Pennington, E. A., Wang, Y., Schulze, B. C., Seltzer, K. M., Yang, J., Zhao, B., Shi, H., Venecek, M., Chau, D., Murphy, B. N., Kenseth, C. M., Ward, R. X., Pye, H. O. T., & Seinfeld, J. H. An Updated Modeling Framework to Simulate Los Angeles Air Quality. Part 2: Quantifying Impacts of On-Road and Volatile Chemical Product Emissions. In prep.

Pennington, E. A., Wang, Y., Schulze, B. C., Seltzer, K. M., Yang, J., Zhao, B., Jiang, Z., Venecek, M., Chau, D., Murphy, B. N., Kenseth, C. M., Ward, R. X., Pye, H. O. T., & Seinfeld, J. H. An Updated Modeling Framework to Simulate Los Angeles Air Quality. Part 1: Model Development, Evaluation, and Source Apportionment. *Atmospheric Chemistry and Physics Discussions*. https://doi.org/10.5194/egusphere-2023-749.

Schulze, B. C., Kenseth, C. M., **Pennington, E. A.**, Seltzer, K. M., Van Rooy, P., Tasnia, A., Barletta, B., Meinardi, S., Huang, Y., Ward, R. X., Parker, H. A., Crounse, J. D., Blake, D. R., Barsanti, K. C., Pye, H. O. T., Wennberg, P. O., & Seinfeld, J. H. The lost decade? The complicated impact of vehicle emissions reductions on ambient aerosol in Los Angeles from 2010-2020. In prep.

Wang, Y., Zhang, C., **Pennington, E. A.**, Seinfeld, J. H. New Insights into Atmospheric Chemistry and Climate Effect of Short-lived Species from the COVID-19 Pandemic. *Nature Geoscience*. Submitted.

De Haan, D.; Hawkins, L.; Wickremasinge, P.; Andretta, A.; De Haan, A.; Welsh, H.; **Pennington, E. A.**; Cui, T.; Surratt, J.; Cazaunau, M.; Pangui, E.; Doussin, J.-F. Brown carbon from photooxidation of glyoxal and SO2 in aqueous aerosol. *ACS Earth and Space Chemistry*. Submitted.

Pennington, E. A., Seltzer, K. M., Murphy, B. N., Qin, M., Seinfeld, J. H., & Pye, H. O. T. (2021). Modeling secondary organic aerosol formation from volatile chemical products. *Atmospheric Chemistry and Physics*, *21*(24), 18247–18261. https://doi.org/10.5194/acp-21-18247-2021.

Seltzer, K. M., Murphy, B. N., **Pennington, E. A.**, Allen, C., Talgo, K., & Pye, H. O. T. (2021). Volatile Chemical Product Enhancements to Criteria Pollutants in the United States. *Environmental Science & Technology*. https://doi.org/10.1021/acs.est.1c04298.

Pennington, E. A. (2020). *CMAQ Tutorial: Modifying a Chemical Mechanism in CMAQ*. Environmental Protection Agency. https://github.com/USEPA/CMAQ/blob/main/DOCS/Users_Guide/Tutorials/CMAQ_UG_tutorial_chemicalmechanism.md

Seltzer, K. M., **Pennington, E.**, Rao, V., Murphy, B. N., Strum, M., Isaacs, K. K., & Pye, H. O. T. (2021). Reactive organic carbon emissions from volatile chemical products. *Atmospheric Chemistry and Physics*, *21*(6), 5079–5100. https://doi.org/10.5194/acp-21-5079-2021.

Yang, J., Wen, Y., Wang, Y., Zhang, S., Pinto, J. P., **Pennington, E. A.**, Wang, Z., Wu, Y., Sander, S. P., Jiang, J. H., Hao, J., Yung, Y. L., & Seinfeld, J. H. (2021). From COVID-19 to future electrification: Assessing traffic

impacts on air quality by a machine-learning model. *Proceedings of the National Academy of Sciences*, *118*(26). https://doi.org/10.1073/pnas.2102705118.

De Haan, D. O., Hawkins, L. N., Welsh, H. G., Pednekar, R., Casar, J. R., **Pennington, E. A.**, de Loera, A., Jimenez, N. G., Symons, M. A., Zauscher, M., Pajunoja, A., Caponi, L., Cazaunau, M., Formenti, P., Gratien, A., Pangui, E., & Doussin, J.-F. (2017). Brown Carbon Production in Ammonium- or Amine-Containing Aerosol Particles by Reactive Uptake of Methylglyoxal and Photolytic Cloud Cycling. *Environmental Science & Technology*, *51*(13), 7458–7466. https://doi.org/10.1021/acs.est.7b00159.